

REMARKS

Claims 20-22 have been canceled subject to applicant's right to file a divisional application for this subject matter.

The examiner has rejected claims 1-6, 9-15, and 18-19 under 35 U.S.C. 102 over Wong. Applicants respectfully assert that this ground of rejection is not well taken.

The present invention relates to integrated circuits and the like. More particularly, it relates to a method for increasing the etch resistance of photoresists which are suitable for use in the production of electronic devices such as integrated circuits. The present invention currently claims:

A method for producing an etch resistant image, which comprises:

(a) coating and drying a photosensitive composition onto a substrate, which photosensitive composition comprises:

(i) at least one water insoluble, acid decomposable polymer which is substantially transparent to ultraviolet or x-ray radiation, wherein said polymer is present in the photosensitive composition in an amount sufficient to form a uniform film of the composition components when it is coated on a substrate and dried;

(ii) at least one photosensitive compound capable of generating an acid upon exposure to sufficient activating ultraviolet, electron beam or x-ray radiation energy, said photosensitive compound being present in an amount sufficient to substantially uniformly photosensitize the photosensitive composition;

(b) imagewise exposing the photosensitive composition to sufficient activating ultraviolet, electron beam or x-ray radiation energy to cause the photosensitive compound to generate sufficient acid to decompose the polymer in the imagewise exposed areas of the photosensitive composition;

- (c) developing the photosensitive composition to thereby remove the exposed nonimage areas and leaving the unexposed image areas of the photosensitive composition;
- (d) irradiating the image areas of the photosensitive composition to sufficient electron beam radiation to thereby increase the resistance of the photosensitive composition in the image areas to an etchant while simultaneously cooling the photosensitive composition during electron beam radiation to maintain the photosensitive composition at a temperature of less than about 20 °C.

The examiner is of the position that Wong et al. teaches each aspect of the presently claimed invention. Applicants respectfully urge that this is not the case. Indeed Wong et al. also relates to a method for increasing etch resistance of photoresists. Wong even discloses several features described by the present invention. However, it is urged that Wong fails to teach *each and every feature* required by the present claims, thus rendering the present invention patentably distinct from Wong et al. Specifically, step (d) of the present claim 1 requires:

- (d) irradiating the image areas of the photosensitive composition to sufficient electron beam radiation to thereby increase the resistance of the photosensitive composition in the image areas to an etchant *while simultaneously cooling the photosensitive composition during electron beam radiation to maintain the photosensitive composition at a temperature of less than about 20 °C.*

According to the present invention, by simultaneously actively cooling the wafer to hold a temperature of less than about 20°C, the pullback on the upper region of lithographic images in resist can be virtually eliminated during electron beam processing. This is because the glass transition temperature of these photoresists is much higher than 20°C.

Wong et al. do not disclose a cooling step for the photosensitive composition *at all*, much less the simultaneous cooling the composition during electron beam radiation. Furthermore, Wong et al. fail to teach the maintaining of the photosensitive composition

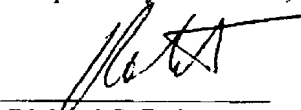
at a temperature of less than about 20°C. The examiner points to claim 21 of Wong which teaches electron beam irradiating while *heating the substrate to a temperature of from about 20 °C. to about 450 °C*. However, Applicants submit that Wong et al. clearly teaches away from the present invention, since Wong's temperature range begins **at** 20°C, while the present invention's temperature range is **less than about 20°C**. Thus, not only do the temperature ranges clearly go in opposite directions, but it is urged that there is no overlap in these ranges. Furthermore, the present application requires an affirmative cooling step while Wong, et al fail to mention an affirmative cooling step.

It is submitted that the absence of these above mentioned features of the present invention from the cited reference renders the present invention patentably distinct from Wong et al. It is therefore respectfully requested that the 35 U.S.C. 102 rejection be withdrawn.

Claims 7, 8, 16, and 17 are objected to as each being dependent on a rejected base claim. Applicants submit that the rejections of the base claims have been overcome by the arguments above, thereby obviating the objections to claims 7, 8, 16, and 17. It is therefore respectfully submitted that this objection should be withdrawn.

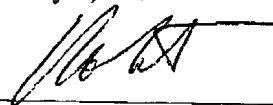
The undersigned respectfully requests re-examination of this application and believes it is now in condition for allowance. Such action is requested. If the examiner believes there is any matter which prevents allowance of the present application, it is requested that the undersigned be contacted to arrange for an interview which may expedite prosecution.

Respectfully submitted,



Richard S. Roberts
Reg. No. 27,941
P.O. Box 484
Princeton, New Jersey 08542
(609) 921-3500
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I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office (FAX No. 703-872-9306) on February 5, 2004.



Richard S. Roberts
Reg. No. 27,941